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SCIENCE NEWS LETTER

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THE WEEKLY SUMMARY OF CURRENT SCIENCE•



Aid for the Land

See Page 90

AUGUST 8, 1936



A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

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Edited by WATSON DAVIS

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DO YOU KNOW?

Thin cream sours more easily than thick cream.

Spring floods this year destroyed 911 state highway bridges.

China has planted millions of trees in recent years, in an effort to reduce flood disasters.

Green tea is unfermented, whereas black tea is produced by allowing the plucked leaves to wither and ferment for a time.

Soybean meal and various salts are used in a novel method for hardening iron and steel.

Tobacco chemists are experimenting with a "puffing robot" which can smoke four cigarettes at a time in uniform puffs, thus shedding light on the exact nature of cigarette smoke.

The deadly mushroom amanita phalloides, called the "destroying angel," has such powerful poison, says a botanist, that people studying a single plant in a closed room have been known to become nauseated.

An airplane makes about 87 times as much noise as the average automobile.

It took 20,000 square yards of cotton goods to make the bag cover for the *Graf Zeppelin*.

Apricot juice and California black cherry juice have been added to the list of fruit juices vacuum-packed in cans.

Government plant scientists pronounce Indian corn "the most completely domesticated grain, quite incapable of maintaining itself without man."

The notion that stars may be seen in daytime from the bottom of a deep well or shaft is discounted by astronomers, who explain that this is merely a myth.

It is conservatively estimated that at one time 60,000,000 buffaloes moved across three-fourths of what now is continental United States—3,000,000 more than the domestic cattle in the United States today.

China is to use both moving pictures and radio programs to promote popular education, according to a comprehensive program of the Ministry of Education.

WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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AGRICULTURE

"Dirtless Farming" Is Now Successful Out in Garden

Tanks of Liquid Plant Food Yield Potatoes at Splendid Rate of over 75 Tons to the Acre

DIRTLESS FARMING," the technique of growing enormous crops of vegetables in tanks of water containing the necessary fertilizer chemicals, has now been carried outdoors by its inventor, Prof. W. F. Gericke of the University of California. He has obtained enormous yields of potatoes, turnips, carrots, and other garden truck from his outdoor vegetable beds in tanks, and he states that "crops can be grown out of doors in liquid culture medium, in proper season, anywhere the given crop is grown by agriculture."

Professor Gericke started his experiments and achieved his first successes with vegetables and flowers grown under glass—the luxury, out-of-season crops that yield the biggest cash returns. This has worked out so well that now several California greenhousemen are trying the system on a large scale, under Professor Gericke's personal supervision. Now he is pioneering with the next step, to bring his tanks out of their glass houses, to test their possibilities in the raising of more plebeian vegetables without the expensive overhead involved in greenhouse culture.

Still Experimental

Professor Gericke stresses the fact that in spite of the successes scored to date he still regards the whole business as being in the experimental stage. All the projects, both in his own laboratory and in the privately owned greenhouses that are co-operating with him, are under his daily personal guidance. He is loath to see his system tried elsewhere by enthusiastic amateurs, or even by experienced gardeners, for, he says, each locality and each crop presents special problems, which cannot be solved on the basis of "dirt farming" experience, no matter how skilled. So he makes haste slowly, discourages "boom" suggestions, and repels would-be promoters.

The system is an expansion of experimental methods that have been in use on a laboratory scale for a long time. Plants are grown in glass jars, without soil, in every college botany department, and sometimes even in the elementary

schools. This is only for the purpose of demonstrating the basic scientific principles of plant growth and for research on their mineral requirements; nobody expects such experiments to be cash-paying propositions.

Professor Gericke, however, several years ago conceived the idea that by putting these "solution cultures" on a wholesale basis they might be made economically profitable, especially since they would permit of closer spacing of plants in greenhouses, where space is naturally at a premium.

He developed a simple type of tank, made either of redwood, concrete, or

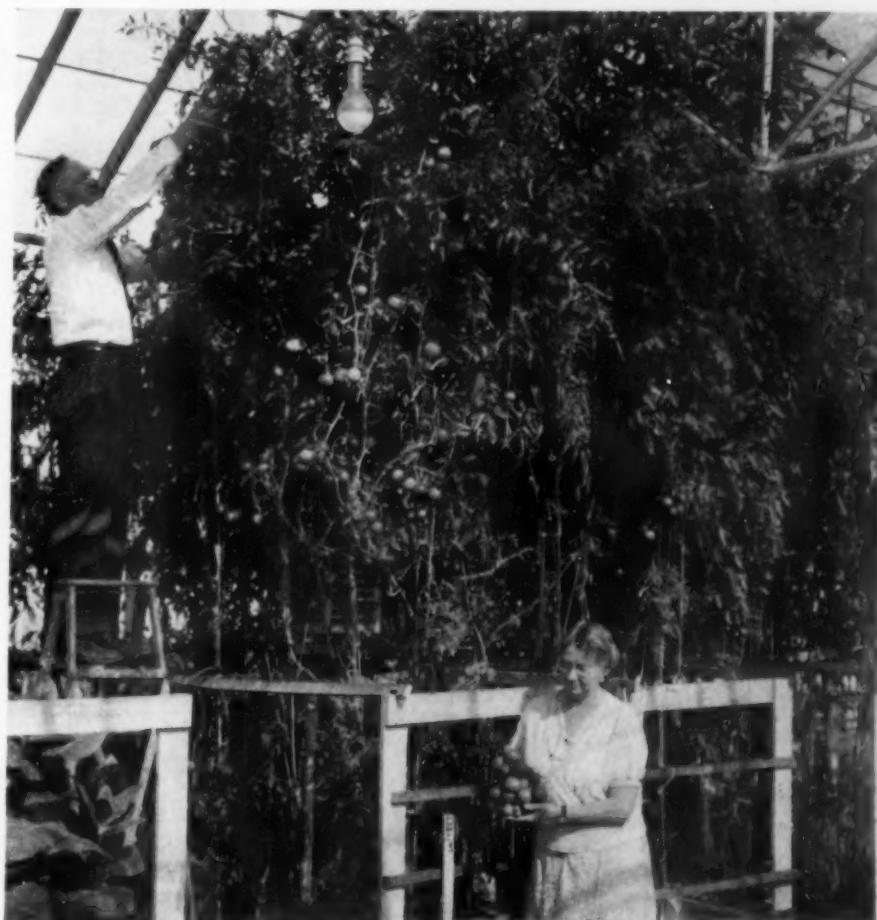
sheet metal. Standard dimensions are $2\frac{1}{2}$ by 10 feet, with a depth of eight inches. Over the top wire netting is spread, to support a "seed bed" of sawdust, moss, excelsior, or other similar material. In this the seeds are planted, or young plants set out, and their roots grow down into the water-filled tank below. Over them is spread a "top dressing" of the same material as the seed-bed, to conserve warmth.

Electric Heating

As used in the greenhouse, the tank also contains an electric heating cable, operating on the same principle as a heating pad or electric iron. This holds the water at the temperature which experiments show will encourage fastest growth in the particular crop under cultivation.

In the tank he also places what he calls a fertilizer unit—a bottle containing the right amount and proportion of mineral nutrients, with a couple of holes in the stopper to let them diffuse slowly into the water as they dissolve.

Yields of the Gericke system have



GIANT TOMATO—IN WATER

been phenomenal. Tobacco plants grew 22 feet high. Gladioli surprised even Californians. Each of four heated greenhouse tanks produced an average of 306 pounds of tomatoes, and the vines grew until the huge clusters of fruit had to be harvested with the aid of a stepladder. One tank, providing exactly a hundredth of an acre of water surface, produced 25.6 bushels, or three-quarters of a ton, of potatoes.

So while Professor Gericke insists that his work is still an experiment, he is willing to admit that it looks rather like a hopeful experiment.

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ASTRONOMY

Did the Moon Kill Eel-Grass on the Coast?

DID the moon have something to do with the way the economically important water plant, eel-grass, died out all along the Atlantic coasts of both North America and Europe during the years 1930-32?

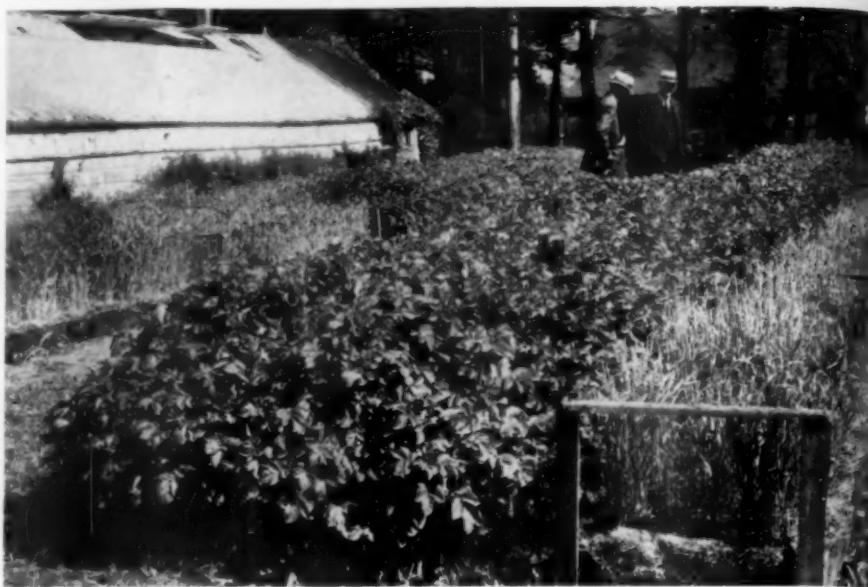
Dr. Neil E. Stevens of the University of Illinois thinks it is a possibility (*Science*, July 24). He sets forth reasons why.

He admits risk in offering such opinions: "One of the surest ways to incur ridicule among scientists is to suggest a relation between some natural phenomenon and the moon. So strong is this feeling and of such long standing that it is of record that Galileo, in comment on Johann Kepler's suggestion that ocean tides were influenced by the moon, expressed regret that so acute a man should have produced a theory which seemed to re-introduce the occult."

Dr. Stevens' tentative explanation introduces the moon in a slightly different role. He notes that the wasting of the eel-grass occurred at the time of the moon's greatest north declination, that is, when the moon's somewhat wavering path took it farthest to the north of the celestial equator. This northward shift also coincided with at least one other season of wholesale death in the eel-grass beds.

These northward marches of the moon are followed by, and presumably to some extent causally connected with, mass movements of warmer Atlantic water toward the north, called transgressions. These invasions of the colder areas of the ocean by warmer water from the south are frequently followed by disturbances in the biologic balance of the ocean, which sometimes amount to outright disaster to fisheries.

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TANK BED

Potatoes growing in two of Professor Gericke's tanks. Alongside is a little experimental wheat, growing in another tank.

CHEMISTRY

Destroyer of Bacteria Is Proved To Be Chemical

THE PUZZLING bacteriophage (bacteria-eater), that destroys harmful germs, is declared by a Rockefeller Institute scientist to be protein, a chemical substance which nevertheless has the ability to "grow" by creating more of itself.

This latest advance in understanding how bacteria are combated was made by Dr. John H. Northrop, working at the laboratories of the Rockefeller Institute for Medical Research (*Science*, July 24). Dr. Northrop is known for his researches upon trypsin, protease and other such substances within the body that are called enzymes.

From a growth of staphylococcus, pus-forming bacteria (that look like bunches of grapes under the microscope) that had been affected by bacteriophage, Dr. Northrop isolated a protein preparation which possesses the properties of bacteriophage. Proteins constitute one of the three major classes of foods and also they are found to be the basis of insulin, the enzymes and other substances the body creates. Important is the fact that proteins have definite chemical compositions, which can be determined by chemical methods.

Extremely minute amounts of this bac-

teriophage protein will cause what the scientists call "lysis," that is, a dissolving of the staphylococcus cultures. Less than a trillionth of an ounce (1×10^{-10} mg) of the newly found protein is effective. Important also is the fact that as this reaction proceeds more of the bacteriophage protein is formed, a phenomenon that caused early investigators of the bacteriophage to conclude that it was alive and reproducing.

First Tests Disappointing

A score of years ago something that combated bacteria in test tubes was discovered by Twort and d'Herelle. Since it destroyed germs in test tube cultures, great hopes were raised that bacteriophage would prove useful in actual treatment of diseases, particularly some that were difficult to control. But the practical tests of bacteriophage were disappointing.

Dr. Northrop's new work may provide a new point of departure for use of bacteriophage in disease treatment, as scientists will now have a concentrated, definite substance with which to work. The protein preparation he obtains is a highly viscous, slimy solution.

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CHEMISTRY-PHYSICS

Two Drops of Blood Reveal Elements in New Analysis

Spectroscope Used in Technique Capable of Finding Elements Present in Only One Part in 100,000

A NEW method of analyzing blood and other body fluids, capable of detecting elements present to the extent of only one part in a hundred thousand, was explained to the scientists attending the spectroscopy conference of the Massachusetts Institute of Technology.

The ultra-penetrating eye of science's master key of investigation, the spectroscope, forms the basis for the delicate and precise analysis. Dr. O. S. Duffendack of the University of Michigan, who developed the new technique along with Dr. Kenneth B. Thomson and Dr. William C. Lee, also of Michigan, told the conference that only two drops of the solution being tested are needed for the investigation, a decided advantage over other methods of analysis in that large amounts of complex body fluids are often not available to investigators.

Dr. Duffendack's technique also has the advantage of being considerably speedier than the usually employed chemical analysis while losing none of that method's precision.

The method was developed particularly for the analysis of urine, blood and other body fluids for sodium, potassium, calcium and magnesium. And Dr. Duffendack has found that the method also works well in ferreting out minute traces of aluminum, chromium, copper, nickel, iron, silicon, and similar substances in electroplating solutions, caustic liquors and other industrial chemicals.

New Research Weapon

The new technique is expected to arm investigators with a powerful new weapon in research and may prove to be the start of a new approach to some of science's most baffling problems.

There are two variations of the method as developed by Dr. Duffendack, each with its own peculiar advantages. In general principle, both employ fundamental spectroscopic technique, spreading the light given off into the colors of the rainbow. Each of these lines, or colors, tells a story, enabling

the scientist to see what elements are present by identifying them from their peculiar tints.

The first variation employs a 25,000 volt inductive spark, maintained between two electrodes which are in reality composed of the solution under analysis. A minimum of nine cubic centimeters, only a few tablespoonsful, of the solution is required for the test but the method regularly yields results with an average error of approximately three per cent.

Need Only Two Drops

The second method utilizes a high voltage alternating current arc between spectroscopic carbons upon which a drop of the solution under analysis has been evaporated. Thus only two drops of the solution are needed for the experiment, a valuable factor in the study of body fluids and other solutions available only in extremely small amounts. This method also has the added advantage of detecting elements present in exceptionally small amounts in solutions containing large amounts of other substances.

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AGRICULTURE

"Through Our Fault" Is the Waste of Land

WE HAVE wasted our land recklessly in the past. In floods and dust storms, in higher taxes and human suffering, we are all paying the price today."

With these words Dr. Rexford Tugwell, now on the Front of the Drought in an effort to maintain the necessary folk-movement as an orderly retreat with good morale, instead of a starved and desperate rout, opens a new publication of the Resettlement Administration, "America's Land." Although written before the present crowning catastrophe in the Northwest, it is based on all-too-vivid national memory of similar harsh events in the recent past.

Incidentally, the pamphlet is a new landmark in better and more interesting-looking typographical work now being turned out by the Government Printing Office. In type, layout, and illustrations it is worthy of any printing plant in the world. Uncle Sam's linotypists, engravers, and pressmen are to be congratulated.

Administrator Tugwell continues his Confiteor: "The individual men who committed this waste did so ignorantly, not willfully. They followed the example of others, an example on which



THE HARVEST

It is hard to imagine where more potatoes could have found space to grow in this limited area. (See page 83.)

society as a whole had set its approval. Our riches were without limit, they thought. Let each man take what lies within his reach.

"Harsh experience has dispelled this pleasant indifference. We have learned that our land, as well as our forests and minerals, must be conserved. We have learned that this is a group, not an individual, problem."

To our forefathers, the text goes on, the idea that some day there might not be enough land for everyone seemed absurd. They felt that "there will be land for the hundredth and the thousandth generation."

To the homesteaders the forest was a bitter enemy. It had to be destroyed before they could work the farms which would make them independent and comfortable. They believed the land and the forests to be endless.

Yet even in early days, the land was not endless. Thousands of pioneers were forced to settle on poor land, or on good land periodically worthless from lack of water, because other men had preempted the most desirable acres. It is the problem of their descendants and successors, in the furrowed hills of the Southeast, on the sun-blasted plains of the Northwest, that has become a national burden today. On our ability to meet and solve it as a national problem will hinge, very largely, our ability to survive as a national entity.

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ARCHAEOLOGY

"Pie Crust" Graves Found in Kentucky

PIE crust" graves, an extraordinary burial fashion of ancient America, have been found in an Indian mound excavated near Lexington, Ky., by Dr. W. D. Funkhouser, professor of anthropology of the University of Kentucky.

The 16 skeletons were found each resting on a baked clay layer and covered by another. The clay was pressed together at the edges in pie crust manner, according to Dr. Funkhouser's report just published.

One skeleton was found accompanied by copper bracelets and rings. Others had buried with them awls, celts, arrow-points, and stone gorgets.

The mound is unique in Kentucky, and is believed to represent Indians influenced by the Hopewell or Adena mound builders, if not actually belonging to one of those Indian cultures.

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CHEMISTRY

First Compound of an Enzyme Discovered in Yale Research

NEW and important knowledge of enzymes, those mysterious chemical agents which play a part in reactions ranging from digestion of food to brewing of beer, has been gained by the discovery of a new compound which contains an enzyme as one of its chemical components. This discovery was made by Dr. Kurt G. Stern of Yale University.

The discovery upsets the still widely held theory that enzymes never enter into chemical reactions, although they exert some force which brings about these reactions, many of which are vital to life. Now Dr. Stern has evidence that at least one of the enzymes does enter into direct chemical reaction.

Catalase, the widely distributed enzyme he studied, breaks down the hydrogen peroxide which the body may form, to harmless water and oxygen. But nobody has been able to study the mechanism of this reaction; for one thing, it

went too fast. Dr. Stern replaced one hydrogen atom in hydrogen peroxide with a heavier radical which is the base of ordinary alcohol, and which is called an ethyl group. The catalase breaks down this material, but at a much slower rate than it breaks down hydrogen peroxide.

Using an instrument called a spectroscope, which detects minute amounts of chemicals by their effects on a beam of light passed through them, Dr. Stern found that the enzyme combined chemically with the material it decomposed. His observations show that the process is: Catalase and ethyl peroxide combine to form a new compound, which breaks down to form catalase, aldehyde, and other products. The production of aldehyde from a peroxide may provide a clue for the function of catalase in animal and plant tissues.

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PHYSIOLOGY

Fresh Green Grass Juice is Newest Growth Promoter

ADD to sauerkraut juice, tomato juice, and other juices that are good for what ails you—grass juice.

Drs. C. A. Elvehjem and E. B. Hart of the University of Wisconsin have discovered that the growth-promoting properties of milk can be markedly enhanced by adding fresh grass juice. Juice squeezed out of lawn clippings was added to the daily milk ration of young rats, causing them to gain weight much more rapidly than "control" rats that got just plain milk.

Liver and brain tissue were also found able to promote growth when added to winter milk.

This finding, if it proves applicable to human nutrition, may point to the desirability of fortifying winter milk with materials containing the growth factor which it lacks. Such additions will not be necessary with milk produced in summer, for cows having access to pasture give a product which is potent in promoting growth.

Just what is the nature of the growth factor with which winter milk is inadequately supplied is not definitely known. The fact that brain and liver apparently contain considerable amounts of it suggests it may be vitamin B₄, but this is not certain.

The fact that the search for materials to improve the quality of winter milk resulted in failure with many substances narrows the possibilities of what the unknown growth factor may be. Vitamins B and B₂ proved of no value in trials at the University of Wisconsin. Since carotene, cod liver oil, orange juice, and irradiation all failed to improve milk as far as the growth factor is concerned, evidently it is not A, C, or D.

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Wistaria vines have been known to live for more than a century, and a vine may spread over a thousand feet of wall area.

PHYSICS

To Harness Sun's Heat To Make Steam Engine Power

Efficiency of "Sun-Fired" Boiler Will Be About Fifteen Per Cent With Advantage of Zero Fuel Cost

SUN POWER will be translated into steam engine power in the near future at the Smithsonian Institution. Dr. Charles G. Abbot, the Institution's secretary, is now engaged in putting the finishing touches on an apparatus in which 36 square feet of aluminum mirror surface will capture enough of the poured-out energy of the world's central heating plant to run a one-half horse-power engine.

Dr. Abbot's new apparatus represents an improving evolution from earlier experimental models. Every part has been carefully planned to achieve a higher thermal efficiency than has ever been attained with solar boilers and other types of sun-heating apparatus.

The initial capture of the sun's rays is effected by means of three trough-shaped mirrors, which can be turned so that they will constantly face the sun. They are surfaced with a highly polished, non-tarnishing aluminum alloy. Instead of being flat, as were most of the mirrors used by earlier experimenters, they are carefully figured to the same type of curve as that used in the great reflecting telescopes in the West, so that their focus is far more accurate and they therefore utilize a much larger percentage of the sun's rays. Their total reflecting area is 36 square feet.

Each mirror will focus the sun's rays on a long, double-walled tube of pyrex glass. Between the two walls a high vacuum is maintained. This permits radiation to pass in freely, but reduces the loss from re-radiation to a very low figure.

Heat-Absorbing Liquid

The inner tube contains a specially compounded black heat-absorbing liquid, of very high boiling point. If it were left stationary in the tubes, it would be raised to a calculated temperature of 700 degrees Centigrade. But it is kept flowing slowly by means of small electric pumps, so that it passes its heat on to water in a boiler, and maintains a more moderate temperature—from 175 to 200 degrees Centigrade above that of the surrounding air. This heat of course converts the water in the boiler into

steam, at about 175 pounds pressure, and the steam will be used to drive the small engine.

Dr. Abbot states that the efficiency of his "sun-fired" boiler will be about 15 per cent, which compares favorably with the efficiency of a coal- or oil-fired boiler—with the advantage that its fuel cost is zero.

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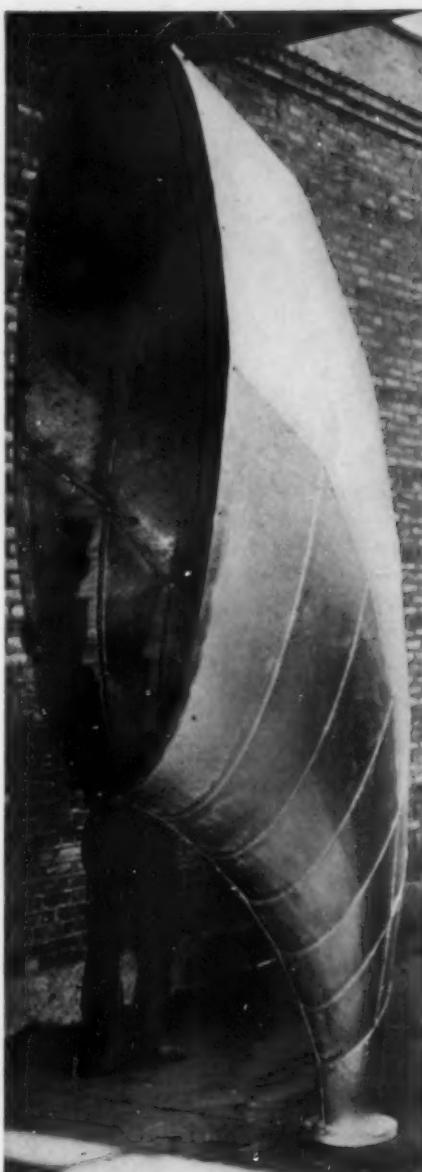
METEOROLOGY

Lightning Slight Hazard To Person Playing Golf

GOLF is classed as one of the more mild outdoor recreations but to others, especially the golf novice who has just tramped between three and four miles over hill and dale, golf sometimes appears to be hard work. And from the widespread publicity which is aroused when a golfer is struck by lightning, the ancient Scotch sport may seem to be one of the "hazardous occupations."

Actually the golfer caught in a thunderstorm with its accompanying lightning is no more in danger than are farmers and other persons who make their living in rural communities. Although death by lightning is one of the rarer forms of accident death, the city dwellers of the nation are, as a rule, safer than their agricultural brethren in this respect. For the nation as a whole, lightning kills less than 400 people a year, based on figures for a ten-year average. The chances of being killed by lightning are only a few parts in a million at the worst. On the Pacific Coast they are as low as two in ten million.

Habits in part account for a slightly increased hazard from lightning in the open and the golfer suffers from the common tendency to get out of the rain when a thunderstorm comes. His first impulse is to seek protection from the rain under the nearest large tree. And if the tree is isolated, as it may very well be on a golf course, he is standing under a favored spot for a lightning stroke. If the tree is in a fairly dense woods, the chances of its being hit are much less.



ONE-PIECE TAILORING IN IRON

This horn-shaped structure, spreading out from 8 inches diameter at the bottom to 8 feet at the top, was once a single flat piece of 3/16 inch ingot iron. The structure is still a single piece of metal—only the shape is different. It was made by cutting out 26 pieces, then fusing them all together into one integral unit.

If the golf course is fairly level and the golfer is caught in the open without protection, he himself forms a possible isolated target for lightning. If he continues to play in the rain and persists in swinging his steel-shafted golf clubs over his head, he is adding still more to his chances of being struck.

Without protection, the golfer would do well to stay in the small depressions on the course.

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CHEMISTRY

Prune Beer Is Newest California Beverage

PRUNE beer is expected to be placed on the market in western states soon. Eberhard A. Klepper, brewmaster of a large San Francisco brewery, has been granted a patent on a process for the manufacture of prune beer, which he claims has a flavor almost identical with other beers, but a higher vitamin content.

Mr. Klepper is now negotiating for the construction of a brewery at Hollister, Calif., in the heart of the prune industry.

Orchardists are watching with considerable interest progress of plans for the manufacture of the new beverage. They state it would open a new outlet for small prunes, always a drug on the market.

Prune beer is practical from a commercial standpoint, Mr. Klepper contends, as it costs no more to manufacture than other brands, and the process is almost identical with the brewing of cereal beer, thereby eliminating the need of installing costly new brewing equipment.

Dried prunes are mixed with water and thoroughly cooked so that all of the flavor and juices are extracted from the fruit, Mr. Klepper said. Malt is added, and the mixture then is sent through crushing machines which prepare it for the mash tubs. It then is sent to the brew kettles.

The brew is kept boiling in the kettles from one to three hours before it is pumped through coolers to the cellar where it is aged, bottled and placed in kegs.

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BIOLOGY

Neutron Bombardment Fatal to Germ-Cells

BOOMBARDMENT with neutrons (atomic particle discovered in 1932) so puts germ cells out of commission that they cannot function, an experiment on wasps, conducted with the aid of U. S. airmail transportation, has demonstrated (*Science*, July 17).

One of the important problems of science today is determining the effect that streams of neutrons have upon living things. One use suggested for them is the treatment of cancer and preliminary experiments offer the hope that they will be more effective than X-rays.

In a test conducted by Dr. P. W.

Whiting of the University of Pennsylvania, male wasps (*Habrobracon*) were sent to Berkeley, Calif., by airmail. There they were irradiated with neutrons from the giant cyclotron apparatus of Prof. Ernest O. Lawrence.

Airmailed back to Dr. Whiting's laboratory, the wasps were mated with untreated females. Because in the family life of these very small parasitic wasps all females come from fertilized eggs and all males from unfertilized eggs, the effect of the neutron irradiation could be determined by whether or not the number of females produced was smaller in the case of irradiated males.

The experiment showed that the neutrons had tended to put the male cells out of commission or, scientifically speaking, produced "dominant lethal genetic effects."

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PALEOBOTANY

Plants Crossed Pacific 200,000,000 Years Ago

EVIDENCE that plants migrated across the Northern Pacific Ocean nearly 200,000,000 years ago in the epoch of time that geologists call Lower Permian has been unearthed in Texas by Harvard explorers.

The discovery of two new species of *Tingia*, a genus of long extinct plants hitherto unknown in America but found in China, was announced by the Harvard University Botanical Museum where the specimens were studied.

Tingia are plants like cycads, a group that flourished for about a hundred million years (during the Mesozoic era) after the age of the discovery just made in Texas. Cycads living today in various parts of the world look like palms or ferns, with root-like trunks rising 20 to 60 feet crowned with leaves.

"This new discovery results in a much better understanding of international geological correlations in the Pacific provinces," declared Dr. William C. Darrah in commenting on the discovery.

The *Tingia* fossils occur beneath beds in which *Gigantopteris* plants were found and they were accompanied by plants known as *Callipteris* and *Walchia*. Finding the same fossils in both Western America and Eastern Asia is proof that there was free migration of them between the two continents. Harvard's Museum of Comparative Zoology field party has collected other fossil plants from a number of new localities in the Southwest.

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IN SCIENCE

ARCHAEOLOGY

Dawn of Civilization Traced in Honduras

EVIDENCE on the dawn of ancient America's highest Indian civilizations, which flowered in the tropics of Mexico and Central America, has been found in the jungle along the Ulua River in Honduras.

A joint expedition of the Smithsonian Institution and Harvard University, just returned, has discovered fragments of pottery which tell a significant story. Broken clay bowls and dishes were found scattered in layers of earth, one above another, showing a succession of inhabitants at several sites. The later people made pottery similar to the classical Mayan style, beautifully decorated in orange, red and black colors. The earlier folk had made simpler clay wares, but beautifully polished and incised. No trace of any earlier people has yet been found in this region.

Early evolution of the Mayan and other Indian groups that developed fine architecture, a writing system and astronomical knowledge in tropical America is a mysterious problem, that archaeological expeditions are eager to untangle.

Dr. W. D. Strong, leader of the expedition, stated that age of the pottery remains to be determined by geologic tests of the soil layers, and other devices.

Alfred Kidder 2d and Drexel Paul represented the Peabody Museum of Harvard on the expedition.

Ancient objects taken from the dwelling sites by the expedition have been deposited in the National Museum of Honduras at Tegucigalpa, to be preserved there for study.

The expedition explored also at Lake Yojoa, Honduras, finding there more evidence of old Indian dwellings lying in stratified deposits. They also investigated the earliest historical horizon at Naco, where the Spanish Conquistadores first encountered the Indians of Honduras. Fragments of pottery discovered at Naco suggest that this place was occupied by people of Aztec Indian culture who were late comers to this region south of Mexico.

Science News Letter, August 8, 1936

SEE FIELDS

SEISMOLOGY

New Quake Strikes the Coast of Chile

AN EARTHQUAKE characterized as "strong" by scientists of the U. S. Coast and Geodetic Survey rocked the coast of Chile early Sunday, July 26, in the same region where an estimated half million dollars worth of damage occurred in the quake of July 13. Additional property damage, if not loss of life, seems probable.

The epicenter of the newest earthquake as calculated by government scientists from data wired to Science Service was 23.5 degrees west longitude and 71.0 degrees south latitude.

This location places the shock center near the towns of Taltal, Chanaral, Tocapilla and Copiapo. Time of the quake was 2:36.9 a.m. E.S.T., July 26. It is highly probable that the shock was felt at sea as well as on shore.

Seismological stations forwarding information to Science Service included: Georgetown University, Washington, D. C.; Fordham University, New York City; Dominion Meteorological Observatory, Victoria, B. C.; St. Louis University, St. Louis, Mo.; and the U. S. Coast and Geodetic Survey Station at Tucson, Ariz.

Science News Letter, August 8, 1936

ARCHAEOLOGY

Find 100-Room Ancient Fort in Arizona

FINDING ruins of a 100-room fortification on Black Mesa, Arizona, where Indians in the thirteenth century sought refuge and safety, is reported by the Rainbow Bridge-Monument Valley Expedition, now exploring in northern Arizona.

The ancient refuge is described by Dr. Ansel F. Hall, general director of the expedition, as consisting of a semi-circular structure two or three stories high on the crest of a hill, and smaller structures on the slope below.

Fragments of pottery collected at the ruins indicate to the archaeologists that Indians of the eastern and western Pueblo areas mingled there. This, Dr.

Hall explains, substantiates earlier discoveries pointing to a concentration of Indian peoples at defensive sites late in the thirteenth century. Soon after, the entire region was abandoned, probably due to effects of the Great Drought of that time.

Dr. Charles Del Norte Winning, of New York University, is field director of the expedition. Charles A. Amsden, of the Southwest Museum, Los Angeles, is chief archaeologist and is in charge of the archaeological camp in Tsegi Canyon. Dr. Clarence C. Clark, New York University, is chief of the biological group, which is working from a camp on Navajo Mountain. Dr. F. B. Loomis, Amherst College, is directing the expedition's geologists.

With new motor equipment, the expedition later this month will make a reconnaissance of parts of Monument Valley heretofore not crossed by motor. The reconnaissance will extend along the 110th meridian.

Science News Letter, August 8, 1936

INVENTION

Triggerless Machine Gun Shoots Without Powder

ACENTRIFUGAL machine gun which is intended to shoot bullets in rapid succession, on the same principle as that by which the sling used by David hurled the fatal stone which slew Goliath, is the subject matter of a U. S. patent (No. 2,043,117) recently granted to B. F. S. Baden-Powell, English inventor and army officer, who is known for his invention of the man-lifting kite.

The novel machine gun has no trigger and uses no powder to send its bullets against the enemy. Hence the familiar rat-tat-tat of conventional machine guns is eliminated. Centrifugal force, the same force that tilts a person riding in a car turning a corner, is the sole "explosive" which "fires" the deadly shell.

Mechanism of the centrifugal machine gun includes a barrel, which radiates from a pie-pan-like shaped chamber provided with a cylindrical wall. The barrel and its chamber spin around at high speed. Into the chamber a magazine carrying the shells drops the projectiles one by one at the proper time. The shells are spun around against the cylindrical wall of the chamber and are guided by a "pusher" mechanism into the breech of the gun. From here the shell is slammed into the barrel and is hurled out toward the target, like a stone from a sling.

Science News Letter, August 8, 1936

DENDROLOGY

War on Dutch Elm Disease To Save New England Trees

SPURRED by preliminary surveys indicating that the infestation of Dutch Elm disease is less this year than in 1935, Federal scientists are continuing their efforts to bring about the eradication of this dread affliction of elm trees. And their efforts will be backed by the new emergency WPA fund of \$1,125,000 recently made available.

Almost all of the near 4,000 Dutch Elm "scouts" now in the field searching for trees having the disease, or being trained for such work, will be employed in the critical battle zone—the area within a 50-mile radius of New York City.

But there are other regions now under suspicion besides the known disease center around the New York metropolitan area in the East. Maryland, Virginia, West Virginia, Tennessee, Missouri, Georgia, Alabama, Louisiana and Mississippi are also suspected.

The watchfulness in these states arises because the elm logs by which the tree disease originally was introduced into the United States came in through one of their seaports; or was used in veneer factories within the states; or because the logs traveled through them.

New York City, Boston, Baltimore, Norfolk, and New Orleans were the ports of entry for the diseased logs.

The only practical treatment for Dutch Elm disease now known, Department of Agriculture experts report, is the drastic one of prompt discovery and removal of every source of infection. Chop down the infected tree despite its size and beauty is the rule in the fight.

The present infestation of Dutch Elm disease came not from the Netherlands—as one might suspect from the name—but from special "burl" elm logs from France which are used as furniture veneer because of their ornamental, curly grain. While only a few shipments of logs are made each year, a careful watch is now kept on them, for no species of American elm seems to be immune to the ravages of the fungus growth causing the disease.

In 1933 infected trees were found in New Jersey counties near New York. In 1934 elm trees were succumbing at the rate of 200 a day.

Particularly worrisome has been the danger that the disease would spread into New England, where the elm is the most important shade tree.

Science News Letter, August 8, 1936

CHEMISTRY

Food for the Land

TVA Turns an Ammunition Plant to the Task of Making Restorative Phosphates for the Farmer's Depleted Soil

By DR. FRANK THONE

TVA, in the minds of most people, symbolizes just two things: electric power, and a stand-up, knock-down, drag-out politico-legal fight about that power.

This is not at all an accurate picture, but it is the most widely-apprehended one. Yet the spectacular struggle-aspect of the TVA could be subtracted from the situation, and still leave TVA as one of the most significant movements that has ever entered the pageant of American history. Power is not needed, to make the work of the Tennessee Valley Authority a very powerful thing, both in its effects on the lives of the people in the Valley and in its ultimate potencies for the lives of all the rest of us.

Take away the "P" for Power, in the TVA set-up, and you will still find the same mump-faced capital letter, this time in the chemist's symbolism: P for Phosphorus. Phosphorus is a chemical element little familiar to most of us, yet one without which none of us could live.

Phosphorus is flesh of our flesh, and even more emphatically bone of our bone: our skeletons are composed largely of calcium phosphate. To obtain this all-necessary life-element we have to depend on plants, and the plants in turn have to depend on the phosphates their roots search out in the soil.

In Verse

Hence the very great importance of phosphorus in any scheme of soil fertilization. When the late Rudyard Kipling many years ago wrote a bit of macabre verse about

"And he who wrote on phosphates for
the crops
Is subject-matter of his own report,"

he showed a knowledge of agricultural chemistry as well as of poetry. In the normal economy of nature, the skeletons of animals, small and great, return to the earth from whence they came, and the cycle of phosphorus thus remains unbroken.

But civilization breaks the cycle in several spots: wheat and cotton are

shipped abroad, the animals go to the slaughter-house and their skeletons do not come back, we ourselves are buried in cemeteries—and too deep for the roots to find us, at that. So the phosphorus content of the soil goes down and down, and the crops become starved and more starved.

Not that phosphorus is the only element of which the soil is robbed by "money-crop" cultivation. Plants need, in addition, nitrogen, calcium, magnesium, potassium, sulphur, and a little bit of iron. All soils need to have their nitrogen content renewed, but fortunately that can be done by the nitrogen-catching bacteria that live on the roots of clover, beans and other legume crops.

Most soils have sufficient reserves of magnesium and sulphur, apparently, for a long time to come. But most of the Tennessee Valley soils and many soils in other parts of the United States are desperately poor in phosphorus. Calcium, or lime, is also needed to "sweeten" these soils and make the other food elements more available to plants.

That is why the agricultural division of TVA, after a critical study of all factors involved with the cooperation of the U. S. Department of Agriculture and state agricultural authorities, picked upon phosphorus as the key to unlock the shackles of poverty that drag upon the limbs of farming in the Valley. What phosphorus can do in the Valley, it should also be able to do in many other areas.

This is not the only factor in a bad situation. The Tennessee Valley is a pretty fair cross-section of much of the nation. Soil poverty, soil erosion, stranded mountain populations and degrading cotton tenancy are representative problems of the Valley.

Rich Soil

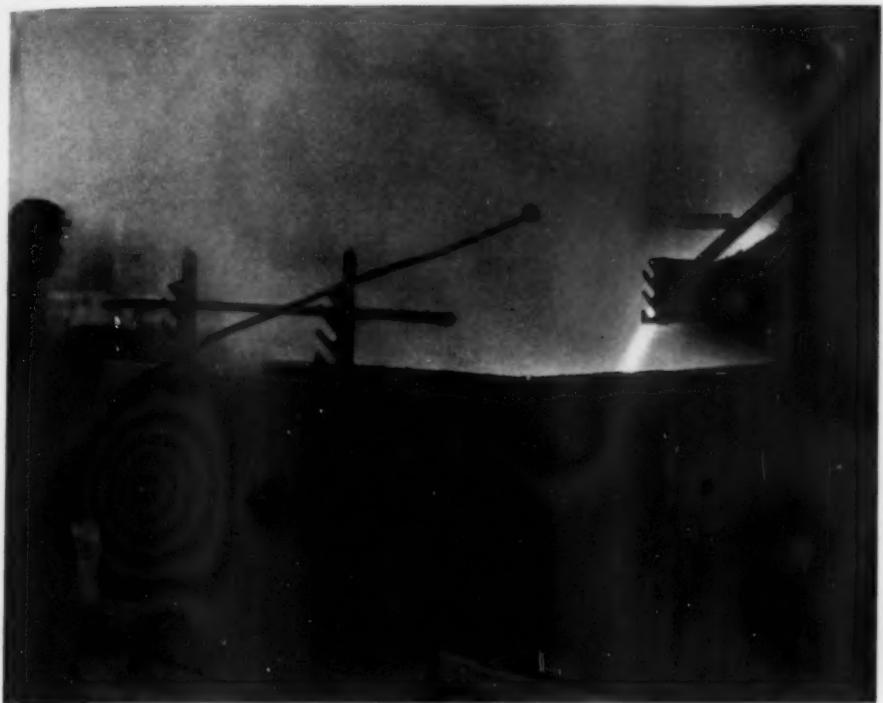
On the other hand, the Tennessee watershed contains abundant water-power resources, some of the country's richest soil and a few examples of good agriculture prosperously coordinated with industry.

TVA is helping the Valley people make counter attacks against all these ills, but soil poverty was selected as the crucial link in the chain, and phosphorus was to be forged into the hammer that could break it.



HAND POWER

Digging phosphate rock from Tennessee deposits. Much of the work is done by hand though power shovels are employed to some extent. An over-burden of soil has to be stripped away. Dump cars on narrow-gauge track carry the rock to standard open freight cars.



ANOTHER STEP

Tapping slag from one of the 6,000 kilowatt electric furnaces in Muscle Shoals Plant No. 2 in which phosphate rock, coke and silica are fused as the first step in a process that yields high strength phosphoric acid. After cooling, the slag is crushed for use in road building or as a concrete aggregate.

This was determined partly by the nature of the terrain, and partly by the forces available—as any well-planned battle is determined. TVA had inherited two war-time plants at Muscle Shoals, neither of which had ever manufactured a ton of the nitrates for which they were first designed. No. 1 Plant had become obsolete, but No. 2 Plant still stood in good running order, with twelve great electric furnaces, that could be the heavy artillery of the fight.

Ammunition was not lacking. While newer processes made the original plan to turn out nitrates rather impractical, the furnaces could be adapted for the production of phosphate fertilizers, and there was plenty of phosphate rock in the Valley's hillsides not very far from Muscle Shoals.

Rich Rock

The phosphate rock is in the Great Basin section of Tennessee where the soils, like those of Kentucky's blue grass lands, are among the richest in the nation because they were formed from underlying phosphate rock. TVA wants to show that rich-land prosperity can be established on lands that are now poor by artificial application of phosphate.

The phosphate rock deposits in Tennessee are not the largest in the country. Florida has larger beds, and the Far

West, particularly Utah, immensely larger ones. In fact, about 95 per cent of all known phosphate beds in the country are in the West—they constitute nearly two-thirds of all the known deposits of really high-grade phosphate rock in the world.

The Process

But the Valley still afforded plenty of phosphate rock to feed the furnaces. TVA contracted with farmers who owned deposits to mine them when they could not work in their fields, and stored the broken rock in great piles near No. 2 Plant. Fed with phosphate rock, coke, and silica, the furnaces yield, by present methods of operation, phosphoric acid. This is mixed with finely ground phosphate rock, and the product is one form of "triple superphosphate."

The story of phosphate fertilizers is worth telling, step by step.

The raw phosphate rock, as dug in the Tennessee Valley and elsewhere, contains a fair amount of phosphorus. Powdered and put on the land "as is," its plant food would become available so slowly that its use would scarcely be practicable. It is also entirely too bulky in relation to the amount of available plant food it contains to pay for long transportation.

The powdered rock is commonly con-

verted into superphosphate by adding sulphuric acid. This common superphosphate averages from 7 to 8.7 per cent of actual phosphorus content.

"Triple-Superphosphate"

There has also been on the market a "triple-superphosphate" fertilizer of up to 18 or 20 per cent actual phosphorus concentration which is made by adding phosphoric acid of 45 to 55 per cent strength to the powdered raw material. The product is moist and gummy and has to be aged and dried before it can be handled. It has never been particularly popular with farmers. They do not realize that, although this material is higher in price per ton than regular superphosphate, it is cheaper per unit of plant food and therefore more economical.

The TVA phosphate plant has been experimenting with a triple-superphosphate made by an improved method. This has proved successful in limited tests and now is being tried out under actual farm conditions. A new phosphatic compound stepping up the content of elemental phosphorus to about 28 per cent is now being tested as a fertilizer at experiment stations. TVA's triple-superphosphate has been made possible by development of a method of mixing high strength phosphoric acid with ground phosphate rock to yield a dry, easily handled product.

What comes out of the rock in the electric furnace is the elemental phosphorus itself in gaseous form at high temperature. At ordinary temperatures phosphorus is a waxy, stiff stuff that burns spontaneously if left exposed to air. At present it is permitted to burn and form the chemical compound phosphorus pentoxide, which is converted into concentrated phosphoric acid for mixing with ground phosphate rock.

Other Uses

But there is no good reason why this valuable, 100 per cent pure elemental phosphorus should not be turned to other purposes. For one thing, it realizes in a new way the purpose for which the plant where it is made was constructed during the World War—a support for the national defense. Phosphorus has several uses in chemical warfare, particularly in the formation of smoke-screens.

It also has many industrial uses, and since it is so concentrated it may be shipped to distant points to be converted into fertilizer, where the freight charges would be too heavy even on

**APPLICATION**

Ready to doctor sick land with essential plant foods and in so doing test the value of TVA's new phosphate in practical farm use. State College supervision requires that the phosphate be used with supplementary materials that increase its value, such as lime, and provision is made for comparison with untreated plots and with plots treated with other phosphate materials.

superphosphates of the best present grades.

The two electric furnaces now in use at Nitrate Plant No. 2 can produce 20 tons of pure phosphorus a day, or about 6,000 tons a year. Any or all of the ten other furnaces in this plant could at need be put to the same purpose, or could manufacture calcium carbide, high-grade steels, and abrasives and refractories.

Thus, TVA's field of activity is to improve the methods of making fertilizer and to encourage farmers to use phosphates, plus lime from the lime-

stone ledges that abound everywhere, as a means for building up their depleted land.

Since "seeing is believing" with farmers as with the rest of us, the demonstration method is used. State college farm agents, who have gained the confidence of farmers through years of work with them, supervise the demonstrations. In fact, these TVA-encouraged activities are but reinforcements for the drive toward good farming that the county agents have been carrying on for years.

Local Demonstrators

There is a farmer demonstrating soil-building in practically every community of the Tennessee Valley. They were chosen by neighbors organized into county soil conservation associations. Other farmers, seeing this phosphate-lime program work for the demonstrators, are beginning to apply it to their own farms.

Even within this restricted agricultural activity, TVA further restricts itself. Its phosphates are not for use on "row-crop" fields—corn, cotton, tobacco, or any of the so-called soil-depleting crops. These to be sure do need fertilizer, but for them the demonstration farmer as well as all others must obtain phosphates from private sources.

In fact, the demonstration program is increasing rather than decreasing the use of commercial fertilizers, including phosphates.

But for the plantings that build the land instead of exposing it to water erosion and sucking the mineral "juice" out of it at the same time—for pasture grass, for clover, lespedeza, cowpeas, soybeans and other legumes, the demonstration farmer gets TVA phosphates free.

That "free" has a string or two tied to it, for TVA isn't in the Santa Claus business. The phosphates are free—at the hopper-mouth in the No. 2 Plant warehouse. The farmer, who has been chosen by his neighbors, must provide handling, and pay freight by truck or railway. He must furnish ground limestone to put on the field with the phosphate, and purchase seed for the land-building crops. He must also keep books on his farm operations—all these things under the supervision of his state college agricultural authorities and the soil conservation association through which he was appointed.

This cooperative program has succeeded so well thus far, that farm communities outside the Valley have begun asking for the privilege of sharing in it.

The cover photograph is of a phosphoric acid plant, showing storage bin and the tall stack from which waste gases are released.

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Science News Letter, August 8, 1936

ZOOLOGY**Hardship in Youth Prolongs Life of Lowly Animals**

HARDSHIP in youth is a good thing—at least. Half-fed through their infancy, cladocera or water-fleas live longer and more vigorously after they have passed middle life, experiments by Dr. Lester Ingle and Prof. A. M. Banta of Brown University have shown.

Cladocera are not fleas, though they do live in the water. They are really crustacea—minute relatives of lobsters, crabs, and crayfishes. They are particularly well adapted to biological experimentation, because they are perfectly content to live in bottles on laboratory shelves. Requiring very little room per individual, they can be studied in statistically significant numbers.

"The essence of Dr. Ingle's results is that limitation in quantity of food keeps the cladocera in a youthful condition," Prof. Banta said, "so that when they are well fed in later life, beginning at a time when most of the animals have 'lived rapidly' on abundance of food and have already died, these previously semi-fed animals assume rapid rates of growth and reproduction. In a way, their active life is just beginning. They are still young animals."

"As judged by the effects upon longevity, the most favorable period for the 'abundant life' is not during the earlier part of life, but at a later period

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when possibly the body of the organism is better able to withstand the effects of a fairly rapid dissipation of vital energy," Dr. Ingle said. "Suffice it to say that any and all of the functions of the body, because of their utilization of vital energy, are factors in determining the life-span.

"The prolongation of the period of youth is perhaps after all not merely a vague dream, but quite possibly may have a basis for realization in temperate living, resulting in the moderate dissipation of vital energy."

Science News Letter, August 8, 1936

INVENTION

New Rubber Soap Wrapper Better Protection, is Claim

CAKES of soap may step out in new wraps—a thin, two to five one-thousandths of an inch thick, waterproof coating of rubber, if a method of coating cakes with rubber for which a patent (No. 2,042,104) has been granted to J. P. Kane, of New York City, should go into commercial use.

Taking the place of the conventional paper wrappers, the sheer rubber coating is claimed to keep the soap water- and weather-proof. To "unwrap" such a cake of soap, the rubber coating is simply stripped off by tugging at a little tab on the side. The rubber wrappers could be colored any desired hue.

According to the inventor, many attempts have been made to turn out rubber-wrapped cakes of soap commercially, but with no success. The rubber coating would not stick to the cake properly. Cakes of soap so coated would stick together and the rubber would "bleed" or run into the soap and discolor it. By his novel method, however, he claims these defects are overcome.

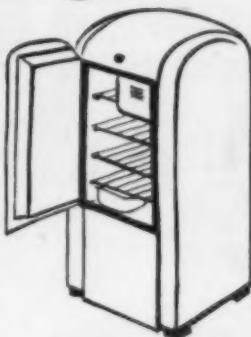
The cakes of soap are sprayed with or dipped into an aqueous solution containing rubber, sulfur, zinc oxide and an "ultra-rapid accelerator." Coated with this solution, cakes then go into a drying chamber, and finally into a vulcanizing chamber. Because of the ultra-rapid accelerator, vulcanization takes place quickly and at low temperatures so that the cake of soap is unaffected.

"In this manner," claims the inventor, "an adherent rubber coating is formed over the cake of soap which snugly fits every indentation and contour so that trade-marks and designs impressed in the soap appear very clearly and present an attractive package."

The coating is permeable to the perfume of the soap.

Science News Letter, August 8, 1936

Let a nation-wide consumer organization advise you— which brands are **BEST BUYS!**



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PHILATELY

New Stamps Commemorate Darwin's Galapagos Visit

CHARLES DARWIN, who launched the doctrine of evolution on its world-shaking career, has been commemorated by the government of Ecuador with a special series of stamps, marking the 100th anniversary of his visit to the Galapagos Islands. It was while he was studying the strange animal and plant forms of this isolated group of volcanic islands, directly west of Ecuador and straight south from Panama, that Darwin, then only 26 years old, got the germ of his famous idea, although he did not publish it until many years later.

There are six stamps in the series. The designs are the work of Dr. Wolfgang von Hagen, a well-known scientist to whose active interest the establishment of the unique nature sanctuary by the Ecuadorean Government has been largely due.

One stamp shows Darwin's picture as a bald and bearded old man, and also the British exploring ship Beagle on which he sailed. Another is a small map of the archipelago. A third shows one of the giant tortoises that gave the islands their name, and a fourth depicts some of the big sea-going lizards, or iguanas. The fifth stamp, showing a landscape with coconut palms, indicates a change in the plant life of the Galapagos since Darwin's time, for he wrote in his journal, "I saw nowhere any member of the palm family."

The sixth stamp bears a picture of Christopher Columbus.

Science News Letter, August 8, 1936

PHYSICS

New Cyclotron Large Enough For Human Radiation

LARGE enough to subject a human being to bombardment by neutrons, a new "atom smasher" or cyclotron is under construction at the University of California's radiation laboratory, where Dr. Ernest O. Lawrence invented this powerful instrument and where he and his associates are continuing its use.

Neutrons are more effective than X-rays in killing animal tumors, it was shown by animal experiments by Dr. John H. Lawrence of Yale School of Medicine, working with his brother at Berkeley. It is therefore possible that medicine is on the verge of applying a new weapon to human cancer.

The electromagnet for the new cyclotron will measure 15 by 20 feet, and weigh over 200 tons. It will be capable of producing 15 million electron volt

energy particles. A small model of the electromagnet is now being tested in the laboratory under the direction of Dr. E. O. Lawrence.

When the cyclotron is finished, it is believed that it will be the largest one in operation. Other large ones are being built at Princeton University, the University of Michigan and at Columbia University.

Since the discovery of the neutron by Dr. James Chadwick in England in 1932, scientists all over the world have been investigating their effects and uses. Cyclotrons are in successful operation at the University of California, the University of Illinois, Rochester University, and other laboratories.

Science News Letter, August 8, 1936

MEDICINE

New Treatment May Conquer Troublesome Skin Disease

APROMISING step toward possible cure of psoriasis, a serious skin disease which has heretofore baffled doctors, was reported to the spectroscopy conference at Cambridge, Mass., by Dr. L. Edward Gaul of New York Post-Graduate Medical School and Hospital, Columbia University.

While his investigation is still in preliminary stages, Dr. Gaul reported that he has been able to effect an almost complete cure in several virulent cases of the disease.

His method is to give his patients a fresh fruit and vegetable diet with occasional rare meat, and periodic injections of carotin, an important constituent of raw carrots noted for its high vitamin A content. This vitamin has been used by doctors in curing other skin afflictions. This method, Dr. Gaul told the conference, was to some extent the result of trial and error procedure.

He had been conducting spectroscopic analysis of living skin tissue in search of lead, gold, silver and other metals which cause such diseases as lead poisoning. In examining the skin of a psoriasis patient to see if metallic poisonings

were possibly involved although blood analyses and other methods failed to detect it, Dr. Gaul's spectroscope found excessive amount of nickel. Believing that this metal might have been introduced into the system through tinned foods, cooking implements, fat compounds used for cooking or in certain types of prepared foods, he limited the patient to a fresh fruit and vegetable diet with occasional rare meat.

Since vitamin A is known to aid some skin diseases, he injected the patient with it in the form of carotin, the forerunner of vitamin A found in great concentration in raw carrots. He also added a pint of raw carrot juice to the daily diet to give the patient even more of the vitamin. Marked improvement in the psoriatic lesions, he said, were noted within six weeks.

"I do not know if nickel, a deficiency of vitamin A or something else causes psoriasis," Dr. Gaul said. "Our research is still in its preliminary stages and to date we have been concerned only with curing the patients. That we have been able to do with a good degree of success."

Science News Letter, August 8, 1936



Carpenter in Feathers

WOODPECKERS are carpenters. That is what they are particularly good for; that is what their natural tools are shaped for. Their very success at carpenter-work inhibits them from trying another trade, like the weaving of the oriole or the mason-work of the swallow. They were prenticed to be carpenters ages ago, and carpenters they will remain until there are no more woodpeckers.

The woodpecker's beak, long, straight, strong, sharp-pointed, is set up as though nature had undertaken to show man how to make a chisel. His head is a hammer, impelled by the extraordinarily strong muscles of his neck and shoulders. His pointed tongue is like an awl—even more like a small saw or round file, for it is armed with numerous sharp little barbs.

Here, however, it must be admitted that the analogy weakens a bit, for that peculiarly wrought tongue is used by the bird not for any woodworking purpose but to drag insect grubs and other tidbits out of the holes his beak has dug. It is as though a carpenter had to chisel open a wooden lunch-box, and then pull his lunch out with the tip of a keyhole saw.

The most ladder-agile of human carpenters might well envy the wood-

pecker his natural climbing-irons. Most birds have three toes pointed forward and one directed backward. The wood-pecker swings one forward-pointing toe on each foot into a back-pointed direction. This gives him two pairs of sharp-clawed, icetong-like grippers on each foot. If you have ever tried to pull a young woodpecker loose from a rough-barked trunk, you will appreciate how hard those toes can hold.

Complement to these hard-holding toes is the stiff-bracing tail. Each of its primary feathers is many times as rigid as the corresponding feathers in other birds' tails, and each ends in a sharp little spud or point. With his toes dug into the bark and this multiple brace of a tail firmly set behind him, the wood-pecker is a combination tripod and

vise, giving his fast-hammering head due support and full freedom of operation.

You wouldn't expect to find wood-peckers where there are no trees, just as you wouldn't expect to find ducks where there is no water. But just as the wood duck nests in trees, some wood-peckers live in the treeless desert.

But they have substitute trees in the sahuaro, or giant cactus. In fact, the desert woodpecker seems to have rather an advantage in homesites, as compared with his forest brethren, for the pulpy interior of the sahuaro trunk is easily gouged out, yet after he has made his cavity the big cactus makes a very hard, rough callus around it, forming a very secure and solid shell.

Science News Letter, August 8, 1936

A Free Copy to Your Friends

TEEN YEARS ago, Science News Letter started as a mimeographed bulletin sent weekly to a small group.

It pleased most of its readers from the start, and they told others. Demand for it soon outran the capacity of a mimeograph and the Letter was put on the presses. Illustrations were added. Its services were expanded. By 1929 it had 7,000 subscribers. The depression years saw it double in circulation until now it is received weekly by more than 19,000 men and women all over the world.

Remembering this, we feel that you may have friends who would like to know about Science News Letter. Send us their names and addresses and we will gladly send to each a free copy.

SCIENCE NEWS LETTER

2101 Constitution Avenue

Washington, D. C.

RADIO

August 11, 2:15 p.m., E.S.T.

WHY REGISTER BIRTHS AND DEATHS?—Dr. Halbert L. Dunn of the United States Bureau of the Census.

August 18, 2:15 p.m., E.S.T.

MEASURING TIME—Paul Sollenberger of the United States Naval Observatory.

In the Science Service series of radio programs over the Columbia Broadcasting System.

*First Glances at New Books

History—Geography

ETHIOPIA—John H. Shaw—Published by the author, 95 p., \$1. A paper bound book that sets forth interesting facts, historic, diplomatic, legendary, geographic, etc., regarding a land much discussed lately. The author, Consul General of Ethiopia, has known that country intimately for the past 20 years, and he has "found the Ethiopians intensely human and honest."

Science News Letter, August 8, 1936

Mathematics

COLLEGE ALGEBRA — Hobart C. Carter—Prentice-Hall, 234 p., \$1.50. A compact and practical text for a first-year college course.

Science News Letter, August 8, 1936

Ethnology

NORTHEASTERN AND WESTERN YAVAPAI—E. W. Gifford—University of California Press, 99 p., 7 pl., \$1.50. A study of an Indian tribe which once spread over some 20,000 miles in the Southwest, and adapted itself to a variety of environments.

Science News Letter, August 8, 1936

Chemistry

LA GÉLATINISATION DES NITROCELULOSES, RÉACTION TOPOCHIMIQUE—Marcel Mathieu—Hermann & Cie, Paris, 73 p., 12fr.

Science News Letter, August 8, 1936

Chemistry

LA NITRATION DE LA CELLULOSE, RÉACTION TOPOCHIMIQUE — Marcel Mathieu—Hermann & Cie, Paris, 65 p., 12fr.

Science News Letter, August 8, 1936

Chemistry

RÉACTIONS TOPOCHIMIQUES GÉNÉRALITÉS—Marcel Mathieu—Hermann & Cie, Paris, 57 p., 12fr.

Science News Letter, August 8, 1936

Electrochemistry

ACTIVITÉ ET INTERACTION IONIQUE—M. Quintin—Hermann & Cie, Paris, 91 p., 18fr.

Science News Letter, August 8, 1936

Chemistry

LES THÉORIES QUANTIQUES—René Arditti—Hermann & Cie, Paris, 33 p., 8fr.

Science News Letter, August 8, 1936

Health

THE JOY FAMILY (Grade 2 of Malden Health Series)—C. E. Turner,

Alice L. Beckwith, and Nell Josephine Morgan—Heath and Co., 130 p., 56c. **TEACHER'S GUIDE FOR USE WITH THE JOY FAMILY**, 14 p., accompanies book.

Science News Letter, August 8, 1936

Conservation

AMERICA'S LAND—Resettlement Administration—Govt. Print. Off., 31 p., Free upon direct application to Resettlement Administration, Washington, D.C. See page 85.

Science News Letter, August 8, 1936

Paleontology

A STUDY OF THE FOSSIL HORSE REMAINS FROM THE UPPER PLIOCENE OF IDAHO—C. Lewis Gazin—Smithsonian Institution, 39 p., 10 pl., 10c.

Science News Letter, August 8, 1936

Physiology

WHY WE SEE LIKE HUMAN BEINGS—Better Vision Institute, Inc., 128 p., 16-p. series of charts in color, \$2. This small handbook with the aid of specially drawn illustrations explains vision in man and other animals.

Science News Letter, August 8, 1936

Archaeology

ARCHAEOLOGY OF SOUTH AMERICA—J. Eric Thompson—Field Museum of Nat. Hist., 160 p., 30 illus., 75c. Describes the most important Indian civilizations of South America, including, of course, the famous Incas and the groups which they welded into their remarkable "autocracy grafted on communism." Dr. Thompson suggests that experiences of this ancient Incan regime may prove of great value in modern civilization's consideration of a planned economy.

Science News Letter, August 8, 1936

History

OUTLINE OF THE HISTORY OF THE UNITED STATES PATENT OFFICE—Patent Office Society, 234 p., \$1. This reprint of the July, 1936, issue of the *Journal of the Patent Office Society* is a valuable historical document recording one important phase of the exciting history of American invention.

Science News Letter, August 8, 1936

Exploration

WITH PLANE, BOAT, AND CAMERA IN GREENLAND—Ernst Sorge—Appleton-Century, 255 p., 196 illus., \$5. Excitement and danger trail this movie-hunting expedition in its efforts to make sound films of Greenland's famous glaciers and fiords. From the vivid tale of experiences, and the many photographs, a stay-at-home reader can get a good idea of life in glacier land. The expedition combined with its photography scientific observations of the formation of icebergs and the geography of the fiords.

Science News Letter, August 8, 1936

Archaeology

ADDITIONAL INFORMATION ON THE FOLSOM COMPLEX; REPORT ON THE SECOND SEASON'S INVESTIGATIONS AT THE LINDENMEIER SITE IN NORTHERN COLORADO—Frank H. H. Roberts, Jr.—Smithsonian Institution, 38 p., 30c. Dr. Roberts' excavations at this camping ground of ancient Folsom Man indicate that the site was visited by small hunting parties in summer and fall, as they followed the bison herds, year after year. Evidence on the "burning issue" of the Folsom-Yuma types of weapon points was obtained.

Science News Letter, August 8, 1936

Physics

WEIGHTS AND MEASURES IN CONGRESS—Sarah Ann Jones—Government Printing Off., 19 p., 5c. This historical summary covers the period from the time of the Continental Congress to the historic resolutions of 1836 and 1838, which began the effective national standardization of weights and measures.

Science News Letter, August 8, 1936

Ethnology

THE ISNEG LIFE CYCLE. I. BIRTH, EDUCATION, AND DAILY ROUTINE—Morice Vanoverbergh—Catholic Anthropological Conference, Washington, D. C., 105 p., \$1.75. A study of native life in the Mountain Province of Northern Luzon, in the Philippines.

Science News Letter, August 8, 1936

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